COURSE DESCRIPTIONS

BASIC COURSES

101 - BASIC COURSE FOR WASTEWATER TREATMENT PLANT OPERATORS. (WPCF TRAINING PROGRAM)

This training program consists of four units. The Characteristics of Sewage unit of the program provides the student with a basic understanding of the characteristics and composition of sewage. The Natural Biological Treatment Process unit provides the student with the practical background theory of his occupation. This unit deals with the biological process involved in wastewater treatment such as aerobic and anaerobic decomposition; and aerobic, facultative and anaerobic bacteria. The Waste Treatment Methods unit begins with a generalized picture of a conventional wastewater treatment plant, briefly introducing flow and processes. Each process phase is then examined in more detail. Included are introductory discussion on pretreatment, primary treatment, secondary treatment, waste treatment variations, and solids handling and disposal. Specifically, this unit covers processes such

This training program is for those already employed as collection system workers as well as those new to the field. It is an introduction to the operation and maintenance of wastewater collection systems. Several objectives include: (a)

as activated sludge and trickling filter processes, and distinguish between the different kinds of waste stabilization ponds.

Educational Point: One

102 - BASIC ELECTRICITY REVIEW AND READING ELECTRICAL DIAGRAMS.

This Basic Electricity Review training program is designed to provide maintenance students with a review of fundamental electrical concepts. The major topics covered in this unit are: the nature of electricity; the six major sources of electricity; basic electrical quantities; series and parallel circuits; Ohm's Law; electromagnetism; inductance; and capacitance.

The Reading Electrical Diagrams training program is designed to teach students how to read four types of electrical diagrams: block diagrams, single line diagrams, schematics, and wiring diagrams.

Prerequisite: Basic understanding of electricity.

describe why the work of a collection system worker is important; (b) describe the three types of wastewater collection systems; (c) identify main types of sewers; (d) describe basic components of the collection system; (e) describe what is meant by and what

Educational Point: One

103 - PLANT SAFETY.

Training material: NUS Training Corporation video-based program. This training program consists of four video tapes. Fire Safety covers types of fires and the most effective extinguishing techniques and equipment are explained in this unit. Hazardous Substances cover dangerous or toxic substances found in the plant and the safety equipment necessary for mitigating these effects. Personal Safety covers various plant hazards (electrical, eye, machinery, etc.) and personal safety equipment (hard hats, safety shoes, eye wear, etc.). Respiratory Protection describes various types of respiratory hazards (particulate, gasses, oxygen deficiency) and respiratory protection gear.

Educational Point: One

104 - WASTEWATER COLLECTION SYSTEMS BASIC COURSE.

should be done about inflow, infiltration, and exfiltration; (f) indicate the importance of dissolved oxygen and microorganisms in wastewater; (g) describe the difference between aerobic and anaerobic decomposition; etc.

Educational Point: One

105 - WASTEWATER MATHEMATICS.

This training course is designed to assist the wastewater treatment operator in reviewing and refreshing his or her skills in solving various basic and related mathematics problems encountered in everyday activities. The major topics have been broken down into: (a) definition, (b) importance, (c) sample problems, (d) practice program and (e) solution to practice problem sections.

Prerequisite: High school algebra; Ken Kerri's course.

Educational Points: Two

106 - HAZARD COMMUNICATION PROGRAM

This training course is designed to provide you with information and training on hazardous chemicals in your work area. Employee training will include the location and availability of the written hazard communication program, including the required list of hazardous chemicals and material safety data sheets required. Other topics include: methods and observation that may be used to detect the presence or release of a hazardous chemicals in the work area (such as monitoring conducted by the This training course is designed to instruct the elements of effective training, planning

employer, visual appearance or odor of hazardous chemicals when being released, etc.); the physical and health hazards of the chemicals and details of the hazard communication program, including an explanation of the labeling system and the material safety data sheet, and how you can obtain and use the appropriate hazard information.

Educational Point: One-half

107 - MULTIPLE HEARTH FURNACE.

This training course is designed to teach maintenance personnel and operators the theory, operations and basic maintenance procedures of the multiple hearth furnace (MHF). Objectives of the course includes: the components of a MHF; description of how sludge moves through a MHF; purpose of the furnace refractory; identification of in-hearth, out-hearth, lute cap, drop holes, and castable insulation; purpose of the flap gate; rabbling; variable speed shaft drive mechanisms; purpose of the top and lower bearings; ash handling systems; components of an off-gas systems; goals of furnace operations; furnace zones; safety precautions; examples of energy conservation measures, etc.

Prerequisite: Knowledge of mechanical maintenance.

for effective training, instructing to facilitate learning, methods for teaching skills,

Educational point: One

108 - NATIONAL POLLUTION DISCHARGE ELIMINATION SYSTEM (NPDES).

This training course is designed to instruct operators, supervisors, and managers on NPDES/UIC permit requirements and other wastewater operations regulatory requirements. The course will include a discussion of NPDES and UIC permits, what they include and how to read them. Copies of all NPDES and UIC permits in the State of Hawaii will be available for students to look at the permit from his/her plant during these discussions. The Federal Clean Water Act will be discussed and a summary of the important information from it will be provided to each students. Applicable State of Hawaii Revised Statutes and Administrative Rules pertaining to wastewater operations will also be discussed and summaries of important information from these documents will also be provided to each student. If there are any County directives, ordinances, rules or regulations pertaining to wastewater operations, they will also be identified and discussed.

Educational Point: One-half

109 - TRAINING-THE-TRAINER

methods for teaching information, using visual aids effectively, teaching your first

class, and learning about visual aid equipment such as slide projectors, overhead projectors, TV/VCR, and movie projector.

Prerequisite: Instructional experience and/or supervisor's recommendation.

Educational Point: One

110 - PUMPING STATION OPERATIONS COURSE

This course is designed to instruct students the following major subject areas: history of the city and county pump stations, pump station security and equipment. Pump station equipment includes: wet well, recorder system, pumps, bubbler/float system, flow meters and generator system. Pump station operations include: use of station O&M manuals, use of pump operating curves, optimizing pump use, pump sequencing, wetwell operating levels, and generator systems operations. Bypasses/overflows/spills will include: reporting, flow rate computations, volume computations, contamination monitoring, sample grab technique, warning signs, and clean-up procedures. Emergency operations will include: back-up equipment and standby power generation. Plus records and reports.

Educational Point: One-half

111 - INTRODUCTION TO MICROCOMPUTER AND DOS

This course is an introduction to microcomputers and disk operating system(DOS) as used in wastewater applications. Part I, Introduction to Microcomputers, is an introduction to the basic concepts of the microcomputers and its different uses in wastewater applications such as process control, process optimization, record keeping and correspondence. The objectives are to learn how to identify the components of a microcomputer, identify different types of wastewater microcomputer, use of the keyboard, how to handle diskettes correctly and understanding computer terminology. Part II, Introduction to DOS, is an introduction to the basic concepts of the disk operating system as used in wastewater applications. The objectives are learn how to set up DOS on the microcomputer, initializing diskettes (format), checking disk status (chkdsk), naming files and what files are, listing files (dir), maintaining files (copy, rename, delete, and erase), hard disk organization, printing text files, control the way the microcomputer starts up, and how to deal with common DOS errors.

Prerequisite: None

Educational Point: One-half

112 - STATE REGULATIONS AFFECTING WTW's WORKSHOP.

This course is designed for WWTP operators and supervisors. Course covers: (1) O&M inspections, (2) spill protocols (for spills reaching surface waters - spills within the confines of a wastewater facility; spills outside of the confines of a wastewater facility, etc.; (3) enforcement policies and types of enforcement; (4) sewage sludge regulations - what is Part 503, land application of sewage sludge, pathogen reduction, etc.; (5) effluent reuse - classes of reclaim water, allowable uses of reclaim water, design requirements for treatment & distribution systems, engineering and other reports needed for reuse projects, etc. (6) underground injection control (UIC) - regulation, definition of a well, examples of injection well facilities, specifics of regulation and how it affects you, and the future developments; and (7) wastewater operator certification - general rule making, role of the Board of Certification, who must be certified, major responsibilities of operators in "direct responsible charge", enforcement, examination, and proposed changes to rules.

Educational Point: One-half

114 - PERMIT - CONFINED SPACE ENTRY

The Permit - Confined Space Entry Course is mandated by Federal and State regulations. The course covers the procedures required to ensure the safety of employees entering and working in confined spaces. Class covers: scope, definition of confined space, permit - required confined space, prohibited condition, evaluation of workplace, mandatory training, authorized entrants, permit system - requirements of entry supervisor, attendants must know hazards, and rescue services.

Educational Point: One-half

115 - BLUEPRINT READING

This course consists of three short videotapes. Titles of the videotapes are: (1) Line and View Interpretation; (2) Dimensions and Tolerance Specifications; and (3) Auxiliary Print Information and Geometric Tolerance. The three part program introduces and explains the basic elements of blueprint reading. The program begins with explaining the idea of the orthographic projection and how the various views and types of lines are used to compose the drawing. Next, the conventional and baseline methods of print dimensioning are shown along with tolerance methods. The auxiliary information contained in the title box, and various notes and lists in included in the third presentation.

Educational Point: One-half

116 - ULTRAVIOLET DISINFECTION

This course discusses: the three common methods for removing pathogens, understand how UV rays destroy the genetic material in pathogens; calculate lamp age, intensity, and exposure time for peak efficiency of the system; understand how ozone is generated and used to kill pathogens; and avoiding the many safety hazards of each system. Also includes troubleshooting and a field trip.

INTERMEDIATE COURSES

201-ACTIVATED SLUDGE PROCESS CONTROL (INTERMEDIATE).

This training program deals with process control in an activated sludge system. As a plant operator, you know that the success of the treatment system is measured by the quality of the effluent. So, your main concern is to make sure that your effluent meets your regulatory agencies requirement. In many cases the required values for the biochemical oxygen demand (BOD) and suspended solids (SS) are less than 30 mg/l and that for the chemical oxygen demand (COD) is less than 100 mg/l. To maintain these levels and, thus have an effective operation, you must: (a) maintain an adequate number of microorganisms; (b) maintain good settling properties; (c) supply adequate air to the aeration tank; and (d) remove sludge from the clarifier before septic conditions or denitrification problems occur. Other objectives include: (a) identify the components of aeration and clarification methods; (b) describe the purpose, operation, and maintenance requirements of major components; (c) use checklist to start-up, shut down and troubleshoot a system; and (d) demonstrate knowledge of F/M ratio, respiration rate, and mean cell retention time for analyzing plant data.

Prerequisite: Successful completion of Basic Course #101.

Educational Point: One

202A - CERTIFICATION EXAMINATION REFRESHER (GRADES 1&2).

This training course is designed to help operators in all categories and classes for the certification examination. General math and maintenance principles, as well as various process control principles, will be covered to meet the needs of those persons attending.

Educational Point: One

202B - CERTIFICATION EXAMINATION REFRESHER (GRADES 3&4)

This training course is designed to help operators in all categories and classes for the certification examination. General math and maintenance principles, as well as various process control principles, will be covered to meet the needs of those persons attending.

Educational Point: One

204-DIESEL ENGINE - OPERATION AND MAINTENANCE, PREVENTIVE AND PREDICTIVE MAINTENANCE, AND MAINTENANCE SAFETY AND EFFICIENCY.

Training material: Industrial Training Corporation videotapes and workbooks. This mechanical maintenance program is a comprehensive program that covers basic diesel engine operation including the function, operation, and maintenance of the air intake system, fuel system, exhaust system, lubricating oil system, and cooling system. Maintenance jobs commonly performed on each of these systems are explained and demonstrated on stationary and automotive diesel engines. Two units on Preventive and Predictive Maintenance and Maintenance Safety are also covered.

Prerequisite: Knowledge of mechanical maintenance.
Educational Point: One

208-PUMP CONTROLS, TYPES, OPERATION AND MAINTENANCE

205-EQUIPMENT OPERATION.

Training material: Industrial Training Corporation video-based program. This training program is designed for students to learn the basic techniques and practices involved in equipment operations. The program will provide the students with guidelines and safety considerations for operating equipment, monitoring normal operations, making adjustments to equipment, performing inspections, and responding to problems. The students will also learn the role of the operator in troubleshooting problems and monitoring the operation or repaired equipment. Four (VHS) videotapes will be discussed: (a) Techniques and Practices for Equipment Operators, (b) Valve Operation, (c)Lubrication for Equipment Operators, and (d) Heat Exchangers.

Prerequisite: Knowledge of mechanical maintenance.

Educational Point: One

206- PRESSURE MEASUREMENT AND FLUID FLOW MEASUREMENT.

This training program consists of two units. The Pressure Measurement unit is designed to provide technicians and operators with a basic understanding of the concept of pressure; the unit commonly used to indicate **(INTERMEDIATE)**

pressure; and some devices and instruments used to measure changes in pressure. It is also intended to teach students about some of the conditions that may prove harmful to instruments and pressure elements and methods of alleviating these conditions. The Fluid Flow Measurement is designed to teach fundamental information on how differential pressure measurements can be used to determine fluid flow and to teach how several common fluid flow meters are used to measure fluid flow.

Prerequisite: Knowledge of mechanical maintenance.

Educational Point: One

207-MECHANICAL MAINTENANCE FUNDAMENTALS FOR OPERATORS.

Training material: Industrial Training Corporation video-based programs. This training course consists of four (4) different topics. The Measuring Instruments Module is a comprehensive program covering the most commonly used measuring instruments such as a steel rule, vernier caliper, outside micrometer, telescoping gauges and dial indicator. Other modules include Bolting and Fastening, Rigging and Lifting, and Bearings and Lubrication.

Educational Point: One

This course is designed to teach students to identify the basic components of pumps and

pump processes and to describe the purpose of pumps in the wastewater field. The course is divided into three parts. Part I covers: (a) basic components of the pump assembly; (b) basic types of motors, starters and enclosures; (c) motor controls; and (d) troubleshooting. Part II covers: (a) centrifugal pumps; (b) basic components of centrifugal pumps; and (c) control of centrifugal pumps. Part III covers: (a) positive displacement pumps; and (b) basic components of positive displacement pumps.

Prerequisite: Knowledge of mechanical maintenance.

Educational Point: One

209-ROTATING BIOLOGICAL CONTACTORS (RBC), TRICKLING FILTERS AND STABILIZATION PONDS.

The Trickling Filters unit discusses waste stabilization ponds, and the treatment process that occurs in them. Topics include: (a) what happens in the waste stabilization pond; (b) indicate why the facultative pond most often is used; (c) describe what happens in the facultative pond; etc. The Trickling Filters unit discusses the treatment process that occurs in the trickling filter. Topics include: (a) describe how treatment occurs in the This course is targeted to supervisors or superintendent of small to medium-sized systems. The training programs are designed for those persons who are or are soon to trickling filter; (b) recall the name of the growth that forms on the filter media; (c) describe the importance of the secondary filter; (d) recall the advantages of recirculating wastewater through the media bed; etc. the RBC unit deals with the equipment involved in the RBC treatment system and the treatment process and how the operator can control the RBC wastewater treatment system. Other topics in the RBC unit include: start-up and shut-down, components and equipment, equipment maintenance, factors affecting the RBC treatment process, trouble-shooting the RBC process, etc.

Prerequisite: Completion of Basic Course.

Educational Point: One

210-SLUDGE HANDLING: SLUDGE THICKENING, ANAEROBIC DIGESTION, AEROBIC DIGESTION AND DEWATERING (INTERMEDIATE).

This training program is designed for the operators of wastewater plants who are involved in the processing of wastewater sludges. Topics to be discussed include: (a) creation of sludge; (b) the processing of sludge; (c) the thickening of sludge; (d) operational and control procedures in sludge become supervisors. Each program deals with a specific content area, focusing on those administrative skills required of a supervisor for effective operation of his/her dewatering; and (e) aerobic and anaerobic digestion.

Prerequisite: Completion of Basic Course 101.

Educational Point: One

211-TROUBLESHOOTING PUMPS: BASIC SKILLS

This course is designed for students to learn ways to investigate a problem, analyze information obtained concerning the problem, repair the problem, and prevent future problems from occurring. The students will learn the importance of understanding normal equipment operations and the equipment background. Specific equipment to be covered include; certrifugal pumps, positive displacement pumps, and reciprocating air compressors.

Prerequisite: Completion of Course #208.

Educational Point: One

212A - WASTEWATER FACILITY MANAGEMENT SKILL TRAINING COURSE
(VOLUME I)

treatment facility. This course contains training programs on: (1) Basic Management Concepts, (2) Budgeting, (3) Personnel Administration, and (4) Public Relations.

Prerequisite: Basic understanding of wastewater treatment plant operation.

Educational Points: Three

212B - WASTEWATER FACILITY MANAGEMENT SKILL TRAINING COURSE (VOLUME II)

This course is targeted to supervisors or superintendents of small to medium-sized systems. The training programs are designed for those persons who are or are soon to become supervisors. Each program deals with a specific content area, focusing on those administrative skills required of a supervisor for effective and efficient operation of his/her treatment facility. This course contains training programs on five subject areas: (1) Emergency Planning, (2) Safety, (3) Preparing and Presenting Reports, (4) Operations and Maintenance, and (5) Selection of New Equipment.

Prerequisite: Completing Course #212A or completing of Wastewater Facility Management Skills Training Course (Volume I) or completion of the Michigan State University Supervisory Management in the Wastewater Field or completion of an equivalent college course.

215 - PLANT SCIENCES (PHYSICS)

Education Points: Three

213 - PUMPS AND PUMPING WORKSHOP (WASHINGTON ENVIRONMENTAL TRAINING CENTER)

This course is designed to teach wastewater treatment personnel "Pumps and Pumping Concepts". Specific topics for Day #1 include: centrifugal pump theory, operating conditions for centrifugal pumps, basic hydraulics and hydrostatics, parts of a pumping system, centrifugal pump types, pump parts and their functions, equipment operation and maintenance, searching for pinpointing leaks, and high tech leak detection. Topics for Day #2 include: basics of pump installation and maintenance, pump piping system, pump lockout procedures, classification of pumps, and how pumps are used. Topics for Day #3 include: troubleshooting pump problems, replacing pump components, packing and seal replacements, suction and discharge conditions, and system head curves.

Prerequisite: Knowledge of mechanical maintenance.

Educational Points: Two

214 - WASTE TREATMENT PROCESSES, COMMUNITY WASTEWATER SYSTEM, PRE-TREATMENT, AND CLARIFICATION (INTERMEDIATE)

This course consists of four major subject areas: Science Fundamentals, Properties of Matter, Heat, and Process Dynamics.

This course continues the instruction begun in the Basic Course. It begins with a recap of the composition of normal domestic wastewater, and the necessity and importance of treating it.
Unit 1 - Introduction and Unit 2 - The Community Wastewater System will provide you with the overall picture of wastewater treatment so that you, the operator, know why your job is so important. Also, these first two units will help you remember the important information from the Basic Course. Unit 3 - Pretreatment discusses bar screens, grit removal, comminutor, prechlorination, flow measuring devices, etc. Unit 4 - Clarification discusses the purpose of clarifier, the clarification process, the two main purposes of clarifier, clarifier efficiencies, description of sludge and scum removal equipment, etc. Plus a water treatment videotape presentation of wastewater collection and primary treatment, intermediate and secondary treatment.

Prerequisite: Completion of Basic Course #101.

Educational Point: One

Plant Science #1 - Science Fundamentals cover some basic scientific principles and

their applications in a process facility are introduced here, along with units of measurement for length, time, mass, pressure, temperature, flow, and level. The relationship between force and motion, the laws that apply to force and motion, the definition of work, and the relationship of work to energy are also covered. The mechanical advantages of the inclined plane and the lever illustrate a discussion of basic machines, including examples of where the mechanical advantages of these basic machines are used in process equipment.

Plant Science #2 - Properties of Matter focuses on the properties of matter associated with solids, liquids, and gases, and demonstrates how these properties influence process system operation. The molecular structures and related characteristics of solids, liquids, and gases are also discussed. The unit defines and explains mass, weight, density, specific gravity, buoyancy, viscosity, elasticity, and other terms associated with the effects of stress, pressure, and temperature on the three states of matter.

Plant Science #3 - Heat teaches the principles of heat transfer, the effects of heat, the relationship between temperature and thermal energy, and the effects of temperature difference on heat transfer. Sensible heat, latent heat, and the effects of

Videotape 1 (Bearings and Lubrication) covers: introduction to bearings, disassembling and inspecting a plain journal bearing, checking the oil clearance of a plain journal bearing using a micrometer, performing a bearing contact check, checking the oil clearance of a plain journal bearing using lead wire, and assembling a plain journal bearing.

pressure on boiling temperatures are covered. The unit also introduces the three modes of heat transfer and discusses heat transfer process that takes place between two fluids separately by a solid boundary.

Plant Science #4 - Process Dynamics introduce the principles and operating characteristics of liquid, gas and vapor systems by describing the main parts of a fluid system and the effects of pressure related to static fluids and steady state flowing fluids. Other topics covered include energy conversions that take place in fluid system, the use of pumps to control flow, common devices to measure process variables, and the effects of resistance and capacitance on operating fluid systems.

Prerequisite: High school general science.

Educational Point: One

250 - MECHANICAL MAINTENANCE I: AIR COMPRESSORS AND BLOWERS

This course is designed to teach wastewater maintenance personnel and interested operators the procedures for disassembly inspection, and repair of reciprocating and rotary compressors. The program shows how typical maintenance operations are preformed on these two types of machines.

Tape 1 covers: reciprocating air compressors, discharge valve removal and disassembly, and suction valve unloader removal and disassembly.

Tape 2 covers: reciprocating air compressors disassembly, piston and piston rod removal, piston ring installation, piston and piston rod installation, and clearance adjustment.

Tape 3 covers: rotary blower disassembly, removing the timing gears, removing the head plate and shafts, removing the bearings, installing the bearings, installing the timing gears, and adjusting the timing and reassembling the rotary blower.

Prerequisite: Knowledge of mechanical maintenance.

Educational Point: One

251 - MECHANICAL MAINTENANCE II: BEARINGS AND LUBRICATION, AND PACKING AND SEALS

This course consists of five videotapes and textbooks.

Videotape 2 (Bearings and Lubrication) covers: introduction to anti-friction journal

bearings, maintenance of tapered roller bearings in a gear-type speed reducer, removing the top housing from a speed reducer, removing a shaft and bearing from a gear reducer, removing the bearing inner ring from the shaft, cleaning and inspecting an anti-friction bearing, replacing and assembling in anti-friction bearing, and using a bearing puller.

Videotape 3 (Bearings and Lubrication) covers: introduction to thrust bearings, tilting pad, oil film thrust bearings, disassembling a tilting pad, disassembling and inspecting the thrust bearing assembly, final assembly of a tilting pad, and bearing lubrication.

Videotape 4 and 5 (Packing and Seals) cover: removing conventional valve packing, installing conventional valve packing, removing preformed chevron packing, installing preformed Chevron packing, fabricating graphite ring packing, removing pump packing, installing pump packing, removing - disassembling and inspecting a mechanical seal, and types of mechanical seals.
Prerequisite: Knowledge of mechanical maintenance.

Educational Point: One

252 - MECHANICAL MAINTENANCE III: GEAR BOXES, MECHANICAL DRIVES, COUPLINGS AND ALIGNMENT

This program consists of three videotapes and textbooks.

Videotape 1 (Gear Boxes) covers: gear boxes, component inspection, performing precision measurements, installing bearings and oil seals, reinstalling the bearing coves and checking shaft runout, checking backlash and tooth contact, and gear designs.

Videotape 2 (Gear Boxes) covers: periodic checks, lubrication, removing and installing the oil seals, worm-gearing design, worm shaft end play, worm gear end play and positioning, and gear box maintenance guidelines.

Videotape 3 (Mechanical Drives, Couplings and Alignment) covers: couplings and alignment, disassembling couplings and detecting angular misalignment, detecting parallel (offset) misalignment, interpreting alignment measurements, correcting misalignment, assembling the coupling, and removing belts.

Prerequisite: Knowledge of mechanical maintenance.

valve construction, disassembling the butterfly valve, and inspecting and reassembling the butterfly valve.

Educational Point: One

253 - MECHANICAL MAINTENANCE IV: VALVES

This program consists of four videotapes and textbooks.

Videotape 1 covers: gate valves construction, disassembling the gate valve, disassembling the gate valve bonnet assembly, inspecting gate valve components, lapping the gate valve disc, reassembling the gate valve bonnet assembly, checking contact between the gate valve disc and seats, and final assembly of the gate valve.

Videotape 2 covers: globe valve construction, removing and disassembling the globe valve bonnet assembly, inspecting globe valve components, reassembling the globe valve bonnet assembly, lapping the globe valve disc, and reassembling the globe valve.

Videotape 3 covers: control valve construction, disassembling the control valve, inspecting control valve components, reassembling the control valve and installing the control valve.

Prerequisite: Knowledge of mechanical maintenance.

Educational Point: One

254 - MECHANICAL MAINTENANCE V: MOTORIZED VALVE ACTUATORS AND RELIEF VALVES

This course consists of four videotapes and textbooks.

Videotape 1 (Motorized Valve Actuators) covers: valve actuators, mechanical components, electrical components, removing a valve actuator from a valve, disassembling a motorized valve actuator, and reassembling a motorized valve actuator.

Videotape 2 (Motorized Valve Actuators) covers: limit switch adjustment, torque switch adjustment, operational tests, limit and torque switch adjustment in another actuator design, mechanical troubleshooting, and electrical troubleshooting.

Videotape 3 (Relief Valves) covers: safety valve operation, safety valve disassembly, removing the disc assembly, blue checking the seat and disc, performing a spindle runout, valve reassembly, completing valve assembly, and installing and setting the safety valve.

Videotape 4 (Relief Valves) covers: relief valve operation, relief valve disassembly, Videotape 3 (Boiler Maintenance) covers types of boilers, interior furnace components, hot gas path components, the outside of the boiler, and waterside components. removing the pilot valve, blue checking the pilot valve, making valve seat repairs, and valve reassembly and installation.

Prerequisite: Knowledge of mechanical maintenance.

Educational Point: One

255 - MECHANICAL MAINTENANCE VI: VIBRATION ANALYSIS, SHAFT ALIGNMENT I, SHAFT ALIGNMENT II, AND ADVANCED ALIGNMENT

This course consists of three videotapes.

Videotape 1 (Vibration analysis) covers: introduction to the hand-held vibration meter, using the hand-held vibration meter, storing the hand-held vibration meter, introduction to the vibration analyzer, taking unfiltered readings, taking filtered readings, and taking signature balancing.

Videotape 2 (Shaft Alignment 1) covers: alignment theory, measuring and correcting misalignment, preparing for alignment, introduction to rim and face alignment, rim and face alignment (measuring vertical plane misalignment), graphing and correcting plane misalignment, and rim and face alignment (horizontal plane misalignment).
Videotape 4 (Boiler Inspection and Cleaning Unit 1) covers water wall inspection, techniques, super heater inspection, inspection of baffles, economizers, and ash hoppers, and exterior boiler inspection.

Videotape 3 (Shaft Alignment II) covers: introduction to reverse dial alignment, measuring and correcting vertical plane misalignment, measuring and correcting horizontal plane misalignment, aligning vertically mounted equipment, and other alignment methods.

Prerequisite: Knowledge of mechanical maintenance.

Educational Point: One point.

256 - MECHANICAL MAINTENANCE VII: BOILERS AND BOILER EQUIPMENT, AND AUXILIARY STEAM TURBINES

This course consists of five videotapes and textbooks.

Videotape 1 (Boiler Fundamentals) covers principles of operation, types of boilers, fuels and burners, heat transfer, water and fuel flow, and water and steam flow.

Videotape 2 (Basic Boiler Systems) covers fuel systems, condensate and feedwater systems, control systems, and instrumentation.

Videotape 5 (Boiler inspection and Cleaning Unit 2) covers drum and moisture separator inspection, header and tube inspection, waterside cleaning, and fireside cleaning and

boiler closure.

Prerequisite: Knowledge of mechanical maintenance.

Educational Point: One

257 - MECHANICAL MAINTENANCE VIII: COAL AND ASH HANDLING EQUIPMENT, AND HYDRAULIC EQUIPMENT

This course consists of four videotapes and textbooks.

Videotape 1 (Coal and Ash Handling Equipment) covers: preparing a conveyor belt for maintenance, cutting a conveyor belt for maintenance, cutting a conveyor belt, punching holes in the belt for a bolted fastener, assembling and installing metal fasteners, completing the bolted metal splice, preparing a belt for splicing with riveted solid metal fasteners, completing the riveted solid metal splice, and installing a riveted hinged splice and aligning the belt.

Videotape 2 (Coal and Ash Handling Equipment) covers: re-blading and balancing a pulverizer exhauster, disassembling a control valve, removing the seat and disc, reassembling the control valve, Videotape 1 covers: introduction to pipe fitting, blueprints, piping materials, material list and field checks, determining pipe length, fitting measurements, marking a pipe, and cutting methods.

disassembling and inspecting an air piston operator, reassembling an air piston operator, water jet exhauster operation and inspection, and assembling a water jet exhauster.

Videotape 3 (Hydraulic Equipment) covers: basic hydraulic systems, hydraulic cylinder disassembly, shaft runout, cylinder reassembly, control valve disassembly, and control valve inspection and reassembly.

Videotape 4 (Hydraulic Equipment) covers: gear pump disassembly, parts inspection, gear pump disassembly, vane pump disassembly, inspection, and vane pump reassembly.

Prerequisite: Knowledge of mechanical maintenance.

Educational Point: One

258 - PIPING

This course consists of four videotapes and textbooks.

Videotape 1 covers: preparing for tubing system repair, flaring tubing, bending and cutting tubing, tubing connections, pipe cutting, threading pipe, pipe assembly, and union replacement.

Videotape 2 covers: torch cutting, using an automatic cutting torch, end preparation tool, alignment, checking alignment and tack-welding, installation, and support.

Videotape 2 covers: general maintenance and insulation removal, elbow removal, elbow installation, selecting and installing insulation on an elbow, insulating a flange and applying cloth, and plastic-lined piping.

Videotape 3 covers: inverted bucket trap, disassembly and reassembly, float and bellows trap disassembly, float and bellow trap reassembly, impulse steam trap (piston type), impulse steam trap (disc type), the duplex strainer, and the edge type strainer.

Videotape 4 covers: cleaning steam condenser tubes, inspecting and plugging steam condenser tubes, cutting a tube for removal, collapsing a tube for removal, replacing a tube, and gauge glass replacement.

Prerequisite: Knowledge of mechanical maintenance.

Educational Point: One

259 - ADVANCED PIPE FITTING

This course consists of four videotapes and textbooks.

Videotape 3 covers: fabricated joints, mitre joints, riser joints, centering heads, contour markers, field marking and hole projection markers.

Videotape 4 covers: introduction to plastic pipe and cutting, end preparation, end cleaning, joining, plastic welding, fiberglass reinforced plastic pipe, cutting and end preparation, making a butt and wrap joint, and program review.

Prerequisite: Completion of Course #258 - Piping.

Educational Point: One

260 - HYDRAULIC SYSTEMS I: INTRODUCTION TO HYDRAULIC SYSTEMS, PRESSURE CONTROLS, AND DIRECTIONAL AND FLOW CONTROLS.

This course consists of three videotapes and textbooks.
Videotape 1 (Introduction to Hydraulic Systems) covers: properties of liquids, hydraulic system components, hydraulic schematic symbols, pressure and flow, system flow and pressure, hydraulic power transmission, hydraulic system efficiency, and hydraulic system safety.

Videotape 2 (Pressure Controls) covers: introduction to pressure control valves, unloading and counterbalance valves, sequence and pressure reducing valves, direct-acting and pilot-operated pressure control valves, external control of pilot-operated valves, spool-type pressure control valves, and pressure reducing valve operation.

Videotape 3 (Directional and Flow Controls) covers: directional control valves, centering conditions, actuating directional control valves, piloting and draining, packed spool valves, flow control valves, flow control valve designs, and flow control applications.

Prerequisite: Knowledge of mechanical maintenance.

Educational Point: One

261 - HYDRAULIC SYSTEMS II: FLUIDS, FILTERS, AND RESERVOIRS; HYDRAULIC PUMPS, PUMPING PRINCIPLES, AND ACCUMULATORS; AND VARIABLE VOLUME HYDRAULIC PUMPS
This course consists of three videotapes and textbooks.

Videotape 1 (Fluids, Filters and Reservoirs) covers: functions of hydraulic fluid, textbooks.

Videotape 1 (Actuators) covers: hydraulic cylinders, cylinder regulation, cylinder repair, hydraulic motors, motor regulation, and motor repair.

262 - HYDRAULIC SYSTEMS III: ACTUATORS, HYDRAULIC SYSTEM TROUBLESHOOTING, AND ELECTRO HYDRAULIC SERVO SYSTEMS

This course consists of three videotapes and

characteristics of hydraulic fluid, fluid conditioning in the reservoir, draining and replacing fluid, reducing external contamination filters, filters, and filter maintenance.

Videotape 2 (Hydraulic Pumps, Pumping Principles, and Accumulators) covers: hydraulic power, hydraulic pumps vane pumps, piston pumps, monitoring pump operation, hydraulic accumulators, accumulators maintenance, and pre-charging an accumulator.

Videotape 3 (Variable Volume Hydraulic Pumps) covers: fixed volume and variable volume pumps, horsepower reduction, variable volume vane pumps, variable volume piston pumps, volumetric efficiency, case drain flow, electrical checks, and reversible pumps.

Prerequisite: Completion of Course #260 - Hydraulic Systems I.

Educational Point: One

Videotape 2 (Hydraulic System Troubleshooting) covers: introduction to troubleshooting, using schematic diagrams, flow-related problems, cylinder malfunction, edge guide circuit malfunction, down-ender

malfunction, and traversing circuit malfunction.

Videotape 3 (Electro hydraulic Servo Systems) covers: signal transmission, servo system schematic symbols, spool servo valves, jet pipe servo valves, flapper servo valves, and frequency response tests.

Prerequisite: Completion of Course #261 - Hydraulic Systems II.

Educational Point: One

263 - LIFTING AND RIGGING

Rigging and Lifting Module is a comprehensive videotape and text training program. It teaches the procedures for using: hand-operated chain hoists, overhead traveling cranes, forklifts, mobile cranes, scaffolding, and ladders. The program shows the various maintenance activities being performed on actual plant equipment.

Videotape 1 includes hand-operated hoists, planning and equipment selection, hoist inspection, shackle and trolley inspection, etc.

Videotape 2 (Liquid level Measurements 2) teaches trainee how to convert pressure measurements into equivalent liquid level measurements. After completing this unit, trainees should understand how indirect level measuring instruments can be used in open tanks, what differential pressure is, how

Videotape 2 includes introduction to overhead traveling cranes, performing an operation inspection on an overhead traveling crane, using a spreader bar, etc.

Videotape 3 includes inspecting a mobile crane, test driving a mobile crane, static and operational inspection of a forklift, removing a pallet from a truck, etc.

Videotape 4 includes components of ladders and ladder selection, climbing and lowering an extension ladder, erecting a fixed scaffold, etc.

Educational Point: One

264 - MECHANICAL MAINTENANCE IX: PNEUMATIC SYSTEMS COURSE (SPECIAL COURSE BY VENDOR)

This course consists of force transmission through fluid, components, air preparation, and system schematics. Force transmission thru fluid consist of fluid definition and effect, factors influencing force transmission, energy transmission using pneumatics, and control of pneumatic pressure.

Components consist of compressors, after differential pressure is measured, and how D/P devices are connected to open and closed tanks.

Videotape 3 (Pressure Gauges and Calibration 1) demonstrates how to read pressure gauges, remove gauges, and return

coolers and driers, receivers and distribution systems, check valves, relief, cylinders, and motors, directional controls, flow control valves, silencers and quick exhaust.

Air preparation consists of filters, mist lubricators and FRL's, water and oil drains. System Schematics include understanding graphic symbols and reading system schematics.

Prerequisite: Knowledge of mechanical maintenance.

Educational Points: Two

265 - MECHANICAL MAINTENANCE X: (FUNDAMENTALS OF INSTRUMENTATION AND CONTROLS) LIQUID LEVEL MEASUREMENTS AND PRESSURE GAUGE AND CALIBRATION.

Videotape 1 (Liquid Level Measurement) focuses on the operating principles of simple level measuring instruments, float-actuated instruments, displacers, magnetic float devices and sonic instruments.

gauges to service. With sufficient practice, trainees should be able to assemble and disassemble adjustable pointer mechanisms and calibrate rotary-geared pressure gauges containing Bourbon tube or bellows pressure elements.

Videotape 4 (Pressure Gauges and Calibration 2) teaches trainees to calibrate a variety of pressure gauges, including retard gauges, absolute gauges, and compound gauges. Trainees also learn to compensate correctly for static pressures when the level of the gauge is different from the level of the pressure being monitored and to select and install devices to protect a gauge from process it monitors.

Prerequisite: Completion of Course #206.

Educational Point: One

266 - MECHANICAL MAINTENANCE XI: (FUNDAMENTALS OF INSTRUMENTATION AND CONTROL: RECORDERS, TEMPERATURE AND TEMPERATURE MEASUREMENT 2, AND INSTRUMENTATION TROUBLESHOOTING AND REPAIR.

Videotape 1 (Recorders) covers the construction and operation of typical circular chart and strip chart recorders and shows the variety of designs and types of available recorders, types of inputs, print drive and Videotape 2 (Pneumatic Control Equipment #2) focuses on the operating principles underlying common types of force balance instruments and motion balance instruments. Trainees are shown how to locate the zero and span or range adjustments on these instruments and how various types of pneumatic relays operate.

chart drive sections, and recorder printers. The unit also demonstrates simple maintenance, troubleshooting, and calibration procedures on both pneumatic and electronic recorders.

Videotape 2 (Temperature and Temperature Measurement #2) explains how thermocouples, (RTDs), thermistors, and infrared temperature sensors operate, and how certain electrical properties and temperature are related and applied in electrical temperature-measuring instruments. Trainees are shown how to obtain a temperature reading with each of the devices covered and how to convert a reading in volts or ohms to degrees. Trainees are also shown how to identify thermocouple types and thermocouple lead wires, how to determine polarity in each of the electrical circuits covered, and how to remove and install the instruments safely. Appropriate electronic test equipment is used to check or troubleshoot electrical temperature-measuring instruments.

Videotape 3 (Instrumentation Troubleshooting and Repair) introduces the types of diagrams and manuals used in

Videotape 3 (Pneumatic Control Equipment #3) focuses on the function, purpose, and operation of five pneumatic control instruments: transmitters, recorders, converters, indicators, and hand-auto control stations. This unit explains how to identify correct output conditions, given instrument

instrumentation troubleshooting and the test equipment used for simulating inputs and measuring outputs. After completing this unit, trainees should be able to identify the problem components in a malfunctioning control loop, given the necessary reference materials. Trainees should also be able to demonstrate good practices for removal, replacement, and repair of process control instruments.

Prerequisite: Completion of Course #265.

Educational Point: One

267 - MECHANICAL MAINTENANCE XII: PNEUMATIC SYSTEMS AND EQUIPMENT

Videotape 1 (Pneumatic Actuators and Positioners) examines the main parts of a diaphragm actuator, a piston actuator, a force balance positioner, and a motion balance positioner. Also covered are how each of these instruments work, how a force balance positioner is adjusted, and how a diaphragm actuator and a valve are stroked.

input conditions, and how to calibrate the instruments.

Prerequisite: Completion of Course #206.

Educational Point: One

268 - MECHANICAL MAINTENANCE

XIII: PNEUMATIC SYSTEMS AND EQUIPMENT.

Videotape 1 (Multi-element Pneumatic Control Systems) discusses the operating principles of ratio control systems, cascade control systems, auctioneering control systems, and three-element feedwater control systems. Trainees learn to trace the associated signal paths and explain the symbols used on simplified logic diagrams.

Videotape 2 (Tuning Pneumatic Control Systems). Discusses how to tune a controller with the guidance and assistance of an experience supervisor or instrument technician. Correct tuning of systems should be prerequisite to successful completion of this training sequence. Tuning, in the context of this unit, involves identifying process and system characteristics, determining how those characteristics affect the tuning process, interpreting process reaction curves correctly, and adjusting the controller properly.

Videotape 3 (Troubleshooting Pneumatic Videotape 1 - Three-Phase AC Induction Motor Maintenance. This unit focuses on the basics of three-phase AC induction motor maintenance: how three-phase motors are constructed; how they operate; and how they are tested, maintained, disassembled, inspected, and reassembled.

Videotape 2 - AC Motor Controller Maintenance. This unit shows trainees how Instrument Systems). Discusses the basics of troubleshooting pneumatic instrument systems. After completing this unit, trainees should be able to demonstrate the correct procedure for troubleshooting pneumatic instrument systems when given specific troubleshooting tasks.

Prerequisite: Completion of Course #267 - Pneumatic Systems and Equipment.

Educational Point: One

269 - ELECTRICAL MAINTENANCE I:

Videotape 1 - Reading Electrical Diagrams, 2. Connection and Interconnection diagrams, raceway diagrams, and logic diagrams are covered in this unit. Trainees learn how to read a "Raceway Schedule"; a Raceway Notes, Symbols, and Detail book; and truth tables.

Videotape 2 - Troubleshooting and Emergency Repair of AC Systems and Equipment. This unit examines AC systems and equipment troubleshooting, with to locate controller components using a schematic diagram and a wiring diagram; how to apply the basic steps of troubleshooting; how to perform preventive maintenance procedures; how to test an energized controller for opens; and how to test a de-energized controller for grounds, opens and shorts.

Videotape 3 - Maintenance of High-Voltage particular emphasis on industrial AC systems, subsystems, units, and components commonly in use. Trainees are taught how to identify and locate grounds, shorts, and opens; how to make simple emergency repairs to AC equipment; and how to be aware of the limitations and safety concerns associated with emergency repairs.

Videotape 3 - Power Supplies. It explains the operation of transformers, rectifiers, filters, regulators, voltage multipliers, and voltage dividers and shows trainees how to identify these devices and circuits on a schematic.

Prerequisite: Completion of Course #102, Basic Electricity Review and Reading Electrical Diagrams.

Educational Point: One

270 - ELECTRICAL MAINTENANCE II: MOTORS AND MOTOR CONTROLLERS

Circuit Breakers and Switchgear (4KV and Over). This unit describes the principles of operation of high-voltage breakers and switch gears; how circuit breakers extinguish an arc and how protective systems work in conjunction with the breakers. After completing the unit, trainees should be able to assist an experienced electrician in performing routine maintenance on air circuit breakers and oil circuit breakers, and in

performing certain electrical tests on breakers.

Prerequisite: Completion of Course #269.

Educational Point: One

271 - ELECTRONIC SYSTEMS AND EQUIPMENT AMPLIFIERS.

Videotape 1 - Operational Amplifiers #1. After completing this unit, trainees should be able to use schematic diagrams to recognize the following basic operational amplifier circuit configurations: voltage followers, reinverted voltage followers, inverting amplifiers, non-inverting amplifiers, differential amplifiers, and instrumentation amplifiers. Given input conditions for these amplifiers circuits, trainees should be able to identify correct circuit output conditions, the basic characteristics of operational amplifiers, and the functions of each of the components within the circuits. They should also be able to recognize the four common operational amplifier package styles.

Videotape 2 - Operational Amplifiers 2.

Videotape 2 - Transistor Amplifiers. This unit explains how transistor amplifier circuit configurations are used as examples to teach trainees about construction, bias, and amplification characteristics. In addition, trainees are shown how to identify the three basic methods of transistor amplifier coupling and how to multistage amplifier

This unit shows trainees how to use schematic diagrams to recognize basic operational amplifiers, summing amplifiers, comparator, integrator, and differentiator circuits. It teaches trainees to identify correct circuit output conditions, given input conditions for these amplifiers circuits, and to perform common routine maintenance and troubleshooting tasks on equipment involving basic operational amplifiers circuits.

Videotape 3 - Using Electronic Test Equipment. This unit on electronic test equipment describes the operation of a Wheatstone Bridge circuit and explains how this circuit relates to the use of resistance decade box, which checks an RTD monitoring system. After completing this unit, trainees should know how to use signal generator, an AC/DC power supply, a vacuum tube tester, and a millivolt potentiometer in common plant applications.

Prerequisite: A general knowledge of electronic systems. Completion of Course #270 is recommended.

Educational Point: One

operates. A typical procedure for troubleshooting a faulty amplifier circuit, including initial in-unit testing, visual inspection, and signal checks, is demonstrated.

Videotape 3 - Transistor Oscillators. This unit covers basic operating principles of

272 - ELECTRONIC SYSTEMS AND EQUIPMENT TRANSISTORS.

Videotape 1 - Transistor Principles. This unit familiarizes trainees with the construction of N-P-N and P-N-P bipolar transistors and explains how a transistor is properly bize, how current flows through a properly biased transistor, and how current flow through a properly biased transistor can be controlled. This unit also covers the construction of a common emitter circuit and explains how this circuit amplifies an electrical signal. After completing the unit, trainees should be able to identify the leads of transistors by their appearance and through the use of a transistor manufacturer's data book. Trainees should also be able to use the data book to select a replacement transistor, and they should be familiar with several types of transistor test equipment. In addition, they should be able to use a digital multimeter to conduct resistance checks on transistors to determine if they are good or bad.

oscillators and how these principles specifically apply to different oscillators. Included are the Armstrong oscillators, the Hartley oscillators, and multivibrators. After completing this unit, trainees should be able to perform simple troubleshooting procedures on a transistor oscillator by applying the techniques discussed in this unit

for Armstrong oscillators and astable oscillators.

Prerequisite: Completion of Course #271.

Educational Point: One

ADVANCED COURSES

301-ACTIVATED SLUDGE SKILLS TRAINING COURSE (ADVANCED).

This training program deals with the process control in an activated sludge system. As a plant operator, you know that the success of the treatment system is measured by the quality of the effluent. So, your main concern is to make sure that your effluent meets your regulatory agencies requirement. In many cases the required values for the biochemical oxygen demand (BOD) and suspended solids (SS) are less than 30 mg/l and that for the chemical oxygen demand

Educational Point: One

303-CHLORINATION SKILLS TRAINING COURSE (ADVANCED).

This training course consists of two parts. Part A contains information on the uses, properties and hazards of chlorine; dosage, (COD) is less than 100 mg/l. To maintain these levels and, thus, have effective operation, you must: (a) maintain an adequate number of microorganisms; (b) maintain good settling properties; (c) supply adequate air to the aeration tank; and (d) remove sludge from the clarifier before septic conditions or denitrification problems occur. Other objectives include: (a) identify the components of aeration and clarification methods; (b) describe the purpose, operation, and maintenance requirements of major components; (c) use checklists to start-up, shut down and troubleshoot a system; and (d) demonstrate knowledge of F/M ratio, respiration rate, and the mean cell retention time for analyzing plant data. Advance activated math problems will also be covered.

Prerequisite: Successful completion of Course #201 or completion of Volume I - Ken Kerri's correspondence course of the California State University, Sacramento.

Educational Point: One CEU for the two-day course. Two CEUs for the 2 1/2-day course.

302-ANAEROBIC DIGESTION SKILLS
residual and feed rate calculations; and identification and function of gas chlorination components. Part B contains a guide for hands-on training that should be conducted in a gas chlorination workshop (if possible).

Prerequisite: Completion of Course #101 or **TRAINING COURSE (ADVANCED).**

This training course is divided into three chapters. In Chapter One, you will work through an overview of both the actual digestion process and the equipment that is used in the system. This includes learning about the two stages of digestion, where and how they occur, and about the most important pieces of equipment like the digesters, heat exchanger, gas lines and sludge lines. Chapter Two deals with the equipment in more detail. You will learn to identify the components of the various pieces of equipment used in this process. Also, you will learn the part each piece of equipment plays in the digestion process. Chapter Three discusses normal operating procedures and process control; all you need to know to keep the digestion system working effectively. You will have an opportunity to practice the calculations that will provide information for process control.

Prerequisite: Successfully completed the Basic Course and Course #210 or completion of Volume I - Ken Kerri's Course.

Volume I -
Ken Kerri's Course.

Educational Point: One

304-ELECTRICAL MAINTENANCE COURSE: LOW AND MEDIUM VOLTAGE MOTOR CONTROLS AND

STARTERS. BY MULTI-AMP INSTITUTE OF DALLAS, TEXAS. (Special Course)

This training course consists of circuit layout, connections and symbols; control pilot devices; basic control circuits; AC reduced voltage starters; three-phase, multi speed controllers; wound rotor (slip ring) motor controllers; synchronous motor controls; direct-current controllers; methods of deceleration; and motor drives.

306 - PROCESS CONTROL LABORATORY COURSE

This training course is ideally suited to prepare operators with the necessary training to perform laboratory sampling and testing. Laboratory procedures covered include: (a) measurement of pH (colorimetric and electro metric method), (b) thirty minute settling test, (c) test solids (TS) measurement, (d) total volatile solids (TVS) measurement, (e) total dissolved solids (TDS) measurement, (f) total residual chlorine measurement (DPD method), (g) dissolved oxygen (DO) test, (h) sampling mixed liquor for the DO test, (i) determining biochemical oxygen demand, (j) Prerequisite: Completion of Course #209 or Volume I - Ken Kerri's course.

Education Point: One

310 - TROUBLESHOOTING ACTIVATED SLUDGE WORKSHOP (SPECIAL COURSE BY DR. MARTHA DOW)

determining alkalinity, and (k) volatile acids measurements.

Prerequisites: Completion of Course #101.

Educational Points: Two

307-SLUDGE CONDITIONING, THICKENING AND DEWATERING SKILL TRAINING COURSE (ADVANCED)

This two-volume training program is designed for the operators of wastewater treatment plants who are, or will become, involved in the processing of wastewater sludges. Volume A, Part I covers the quality and quantity of sludge produced. Topics include primary sludge, secondary biological sludges, chemical sludges, and miscellaneous wastewater sludges. Part 2 covers chemical conditioning of sludge. Topics include storage and handling, chemical feeders and processes control for chemical sludge conditioning. Volume B covers sludge dewatering. Topics include drying beds, centrifuges, vacuum filters, belt filter presses, and pressure filters.

This workshop focuses on activated sludge process control and troubleshooting. Topics include overview of activated sludge, activated sludge microbiology, microscopic observation, staining techniques, process control techniques, operational problems and troubleshooting, bulking activated sludge, filamentous microorganisms, flow and mass

Prerequisite: Completion of Course #210 or Volume II - Ken Kerri's course.

Educational Points: Three

308-WASTEWATER STABILIZATION PONDS (ADVANCED).

The general objective of this training program is to increase the ability of the student to recognize and understand the function and operation of a facultative waste stabilization pond. Several points to be discussed include: (a) locate and describe components and, where necessary, explain how they work; (b) distinguish between various types of ponds; (c) distinguish between the responsibilities of the operator and those of the owner; (d) describe how bacteria/algae cycle works; (e) explain methods of aeration and the various zones in a ponds; (f) explain the advantages and disadvantages of parallel and series operation in terms of BOD, SS and fecal coliform removal; etc.

balance, process control program management, sludge accountability, optimizing unit procedures, and performance evaluations and hands-on training at a treatment plant.

Educational Point: Three.

312 - ADVANCED LABORATORY

COURSE

This course is designed to supplement Course #306 - Process Control Laboratory Course as well as to introduce advanced topics in wastewater chemistry, biomonitoring and toxicity testing, etc. Course objectives are: to learn and apply advanced analytical techniques and good laboratory practices; to apply knowledge and skills learned in previous laboratory course; to know how to properly collect and handle analytical samples; to know how to validate analytical data; to know how to write standard operating procedures; to understand quality assurance and quality control; and to recognize unsafe laboratory practices.

Prerequisite: Completion of Course #306.

Educational Points: Two

NOTE: Course #312 replaces Courses #309 and #311. Anyone who has previously completed Courses #309 and #311 should not register for Course #312 as the instruction would duplicate training already received.

314 - LABORATORY SKILLS TRAINING FOR SUPERVISORS AND MANAGERS

This two day course for supervisory personnel in wastewater treatment operations focuses on the process control laboratory. The increasing emphasis on treatment upgrades, effluent re-use, and managing costs through treatment optimization are factors driving the need for reliable data from the laboratory. Students will receive classroom instruction in laboratory test methods and operations, then apply these skills in a laboratory setting. The training topics will stress quality control in sample collection and handling, analytical testing, data evaluation and reporting, and basic laboratory management. Techniques for charting data and trends will also be covered.

Prerequisite: Process supervisors, plant managers, and operators responsible for controlling treatment plant processes and improving laboratory operations will benefit from this class.

Educational Point: One